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EXAMINER	
ALBERTALLI, BRIAN LOUIS	
ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	09/942,896	NAKATSUKA, HIRONAGA
	Examiner	**Art Unit**
	Brian L Albertalli	2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendments to the claims submitted December 13, 2004 have been entered. Claims 1, 5-6, and 10-12 are currently amended, and new claim 13 has been added.

Response to Arguments

2. Applicant's arguments, see page 8, 2nd and 3rd paragraphs, filed December 13, 2004, with respect to the rejection(s)of independent claim(s) 1 and 10-12 under 35 U.S.C. 102(b) as being anticipated by Matsui et al. (U.S. Patent 5,835,890) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made under 35 U.S.C. 103(a) as being unpatentable over Matsui et al., in view of McKinley et al. (*Noise Model Adaptation in Model Based Speech Enhancement*), and further in view of Pastor (U.S. Patent 5,572,623).

3. Furthermore, with regard to the use of official notice in the rejection of claim 6, it is noted that the applicant has not made any attempt to traverse the assertion of official notice, therefore the well-known in the art statement is taken to be admitted prior art (see MPEP 2144.03).

Claim Objections

4. The amendments to the claims overcome the objections made in the previous office action. The objections to the claims are withdrawn.

Claim Rejections - 35 USC § 102

5. As discussed above, the rejections under 35 U.S.C. 102(b) as being anticipated by Matsui et al. (U.S. Patent 5,835,890) are withdrawn. However, upon further consideration, a new ground(s) of rejection is made under 35 U.S.C. 103(a) as being unpatentable over Matsui et al., in view of Pastor (U.S. Patent 5,572,623).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 4, 5, 8, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. (U.S. Patent 5,835,890), in view of McKinley et al. (*Noise Model Adaptation in Model Based Speech Enhancement*), and further in view of Pastor (U.S. Patent 5,572,623).

In regard to claim 1, Matsui et al. discloses an apparatus that includes a data extraction means (feature extracting part 11, Fig. 3) (column 5, lines 34-40), as well as a model adaptation means (adaptation part 15). The model adaptation means adapts the

extracted data by means of the most (maximum) likelihood method (column 6, lines 10-59).

Matsui et al. does not disclose that the model is an acoustic model for ambient noise.

McKinley et al. discloses a method of creating an acoustic model for ambient noise (noise model) and a method to adapt that noise model (sections 2 and 3).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Matsui et al. to create and adapt an acoustic model for ambient noise, as disclosed by McKinley et al., because "noise model adaptation is essential for proper operation", as taught by McKinley et al. (abstract and section 1).

Neither Matsui et al. nor McKinley et al. disclose the model adaptation means adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech.

Pastor discloses a method for collecting ambient noise frames for adapting an ambient noise model in a noisy environment, which adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech (microphone switching indicates a time area close to the speech signal, column 4, lines 48-54; a first voiced frame is searched for in the vicinity of the switch time, column 4, lines 60-68; when found, the N2 frames which precede the voice framed are used as noise frames, column 4, line 66 to column 5, line 3; which is used to adapt noise models, column 5, lines 19-29).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui and McKinley et al. to adapt the noise model during an observation interval that ends when a speech switch was turned on when a user started speech, since the noise frames immediately preceding the speaking interval would be the most similar to noise that occurred during the speaking interval, and would provide the best noise models for improving subsequent recognition.

In regard to claim 4, Matsui et al. discloses that the pattern recognition is performed on the basis of feature distribution in a feature space (recognition result step S5, column 7, lines 22-35). The model adaptation means (adaptation part 15) adapts the model using the feature distribution obtained from the extracted data (column 6, lines 10-21).

In regard to claim 5, Matsui et al. discloses that a measure indicating the degree to which the extracted data is observed in the predetermined model becomes maximum, by means of the most (maximum) likelihood method (Equation 4, column 6, lines 10-59).

In regard to claim 6, Matsui et al. discloses a model adaptation means that adapts a model so that a measure indicating the degree to which the extracted data is observed in a predetermined model becomes maximum by means of the maximum (most) likelihood method. Additionally, Matsui et al. discloses that the equation that

calculates a measure indicating the degree to which the observed data is observed in a predetermined model requires the model parameters of the predetermined models (Equation 4, θ; see column 1, lines 51-67 and column 2, lines 1-7 for a definition of θ).

The combination of Matsui et al., McKinley et al., and Pastor, as applied to claim 1, above, does not disclose the model adaptation means determines a parameter of the predetermined model, which give a maximum value based on the maximum (most) likelihood method, by means of the Newton descent method or the Monte Carlo method.

The examiner takes official notice that it is well known in the art to use the Monte Carlo method to estimate statistical parameters in a Gaussian distribution.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Matsui et al. so the statistical parameters of a predetermined model were estimated by means of the Monte Carlo method, so the calculations could be done more quickly than calculating the exact statistical parameters of a predetermined model.

In regard to claim 8, Matsui et al. discloses that the input data is voice (speech) data (column 5, 34-40).

In regard to claim 9, Matsui does not disclose that the predetermined model is an acoustic model representing input data during an interval which is not a voice interval. An interval which is not a voice interval has been interpreted herein as a “no speech” interval.

McKinley et al. discloses a method of creating an acoustic model representing input data during an interval which is not a voice interval (noise model) and a method to adapt that noise model (sections 2 and 3).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui et al., McKinley et al., and Pastor, as applied to claim 1, above, to create an acoustic model representing input data during an interval which was not a voice interval, as disclosed by McKinley et al., because "noise model adaptation is essential for proper operation", as taught by McKinley et al. (abstract and section 1).

In regard to claim 10, Matsui et al. discloses a method of adapting a model used in pattern recognition which includes the steps of:

Extracting input data corresponding to a predetermined model, observed during a predetermined interval, and then outputting the extracted data (Fig. 2, step S1, column 5, lines 34-40).

And adapting the predetermined model extracted during the predetermined interval by means of the most (maximum) likelihood method (Fig. 2, step S3, column 6, lines 10-59).

Matsui et al. does not disclose that the model is an acoustic model for ambient noise.

McKinley et al. discloses a method of creating an acoustic model for ambient noise (noise model) and a method to adapt that noise model (sections 2 and 3).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Matsui et al. to create and adapt an acoustic model for ambient noise, as disclosed by McKinley et al., because "noise model adaptation is essential for proper operation", as taught by McKinley et al. (abstract and section 1).

Neither Matsui et al. nor McKinley et al. disclose the model adaptation means adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech.

Pastor discloses a method for collecting ambient noise frames for adapting an ambient noise model in a noisy environment, which adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech (microphone switching indicates a time area close to the speech signal, column 4, lines 48-54; a first voiced frame is searched for in the vicinity of the switch time, column 4, lines 60-68; when found, the N2 frames which precede the voice framed are used as noise frames, column 4, line 66 to column 5, line 3; which is used to adapt noise models, column 5, lines 19-29).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui and McKinley et al. to adapt the noise model during an observation interval that ends when a speech switch was turned on when a user started speech, since the noise frames immediately preceding the speaking interval would be the most similar to noise that occurred during the speaking interval, and would provide the best noise models for improving subsequent recognition.

In regard to claim 11, Matsui et al. discloses a storage medium (Fig. 3, memory 10M) which stores a program for executing using a computer (control part 10) adaptation of a model used in pattern recognition (column 5, lines 20-33). The program comprises the steps of:

Extracting input data corresponding to a predetermined model, observed during a predetermined interval, and then outputting the extracted data (step S1, column 5, lines 34-40).

And adapting the predetermined model extracted during the predetermined interval by means of the most (maximum) likelihood method (step S3, column 6, lines 10-59).

Matsui et al. does not disclose that the model is an acoustic model for ambient noise.

McKinley et al. discloses a method of creating an acoustic model for ambient noise (noise model) and a method to adapt that noise model (sections 2 and 3).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Matsui et al. to create and adapt an acoustic model for ambient noise, as disclosed by McKinley et al., because "noise model adaptation is essential for proper operation", as taught by McKinley et al. (abstract and section 1).

Neither Matsui et al. nor McKinley et al. disclose the model adaptation means adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech.

Pastor discloses a method for collecting ambient noise frames for adapting an ambient noise model in a noisy environment, which adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech (microphone switching indicates a time area close to the speech signal, column 4, lines 48-54; a first voiced frame is searched for in the vicinity of the switch time, column 4, lines 60-68; when found, the N2 frames which precede the voice framed are used as noise frames, column 4, line 66 to column 5, line 3; which is used to adapt noise models, column 5, lines 19-29).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui and McKinley et al. to adapt the noise model during an observation interval that ends when a speech switch was turned on when a user started speech, since the noise frames immediately preceding the speaking interval would be the most similar to noise that occurred during the speaking interval, and would provide the best noise models for improving subsequent recognition.

In regard to claim 12, Matsui et al. discloses an apparatus for classifying input data in the form of a time series into one of a predetermined number of models. The apparatus includes:

A feature extraction means for extracting a feature value of input data and a data extraction means for extracting input data corresponding to a predetermined model observed during a predetermined interval that outputs the extracted data (feature parameter extracting part, Fig. 3, 11, extracts a feature value of the input data and

extracts input data corresponding to a predetermined model observed during a predetermined interval, column 5, lines 34-48).

A storage means for storing a predetermined number of models (12).

A classifying means for classifying the feature value of the input data into one of said predetermined number of models (model sequence selecting part 13 selects model that are most closely matched to the input feature parameter sequence, column 5, lines 41-67 and column 6, lines 1-9).

And a model adaptation means for adapting the predetermined model using data extracted during the predetermined interval by means of the most (maximum) likelihood method (adaptation part 15, column 6, lines 10-59).

Matsui et al. does not disclose that the model is an acoustic model for ambient noise.

McKinley et al. discloses a method of creating an acoustic model for ambient noise (noise model) and a method to adapt that noise model (sections 2 and 3).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Matsui et al. to create and adapt an acoustic model for ambient noise, as disclosed by McKinley et al., because "noise model adaptation is essential for proper operation", as taught by McKinley et al. (abstract and section 1).

Neither Matsui et al. nor McKinley et al. disclose the model adaptation means adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech.

Pastor discloses a method for collecting ambient noise frames for adapting an ambient noise model in a noisy environment, which adapts a model during a noise observation interval that ends when a speech switch is turned on when a user starts speech (microphone switching indicates a time area close to the speech signal, column 4, lines 48-54; a first voiced frame is searched for in the vicinity of the switch time, column 4, lines 60-68; when found, the N2 frames which precede the voice framed are used as noise frames, column 4, line 66 to column 5, line 3; which is used to adapt noise models, column 5, lines 19-29).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui and McKinley et al. to adapt the noise model during an observation interval that ends when a speech switch was turned on when a user started speech, since the noise frames immediately preceding the speaking interval would be the most similar to noise that occurred during the speaking interval, and would provide the best noise models for improving subsequent recognition.

8. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al., in view of McKinley et al. in further in view of Pastor, and further in view of Rao et al. (U.S. Patent 5,978,760).

The combination of Matsui et al., McKinley et al., and Pastor, as applied to claim 1, above, does not disclose that the model adaptation means by using a freshness degree indicating the freshness of the extracted data. Matsui et al., McKinley et al., and

Pastor also do not disclose that the freshness degree is a function which varies depending on the temporal position of the extracted data.

Rao et al. discloses a noise parameter generator (Fig. 4, 40) that creates a noise model (noise parameters) that includes a freshness degree (exponential weighting function) that indicates the freshness of the extracted data (column 4, lines 4-43). The freshness degree (exponential weight) varies depending on the temporal position of the extracted data (column 3, lines 43-51).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Matsui et al., McKinley et al., and Pastor so the model adaptation means also included a freshness degree to indicate the freshness of the extracted data, wherein the freshness degree was a function that varied depending on the temporal position of the extracted data, as disclosed by Rao et al., so that the model adaptation means would create a noise model that that represented the actual background noise better than a noise model without a weighting, as taught by Rao et al. (column 3, lines 9-11).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. in view of McKinley et al., in further in view of Pastor, and further in view of Komori et al. (U.S. Patent 6,108,628).

Matsui et al. discloses that the model adaptation means adapts a model so that a measure indicating the degree to which the extracted data is observed in a

predetermined model becomes maximum by means of the most (maximum) likelihood method.

The combination of Matsui et al., McKinley et al., and Pastor, as applied to claim 1, above, does not disclose that the model adaptation means adapts a model so that a measure indicating the degree to which the extracted data is observed in a predetermined model becomes maximum or minimum by means of the minimum distance-maximum separation theorem, or that the measure is defined using a Bhattacharyya distance.

Komori et al. discloses that a measure indicating the degree to which extracted data is observed in a predetermined model becomes minimum by means of the minimum distance theorem (column 4, lines 24-55). The measure is defined using a Bhattacharyya distance (Equation 2).

It would have been obvious to one of ordinary skill in the art at the time of invention to alternatively further modify the combination of Matsui et al., McKinley et al., and Pastor, so models were represented in a feature space and so the degree to which extracted data was observed in a predetermined model was determined by the minimum distance theorem with the distance measure defined as a Bhattacharyya distance, as taught by Komori et al., in order to measure the similarity between two models in a more detailed manner by replacing the phoneme model HMM of Matsui et al. with a more detailed HMM dependent on the phoneme environment, as taught by Komori et al. (column 3, lines 56-67 and column 4, lines 1-7).

Allowable Subject Matter

10. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not disclose and would not suggest to one of ordinary skill in the art at the time of invention a noise observation interval which is split into two sub-intervals *wherein the acoustic model is adapted during a second sub-interval.* The closest prior art of record teaches collecting and adapting a noise model *simultaneously*, not performing the data extraction and adapting at two seperate time periods (sub-intervals).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamaguchi et al. (U.S. Patent 6,026,359) and Chiang (U.S. Patent 6,188,982 disclose additional methods for noise model adaptation. Gong (U.S. Patent 6,418,411) disclose a method that adapts a noise model during an interval between the time a speech switch is activated and an audible sound that indicates to the user to begin speaking.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L Albertalli whose telephone number is (571) 272-7616. The examiner can normally be reached on Mon - Fri, 8:00 AM - 5:30 PM, every second Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLA 5/4/2005

DAVID L. OMETZ
PRIMARY EXAMINER